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GB A 2052221
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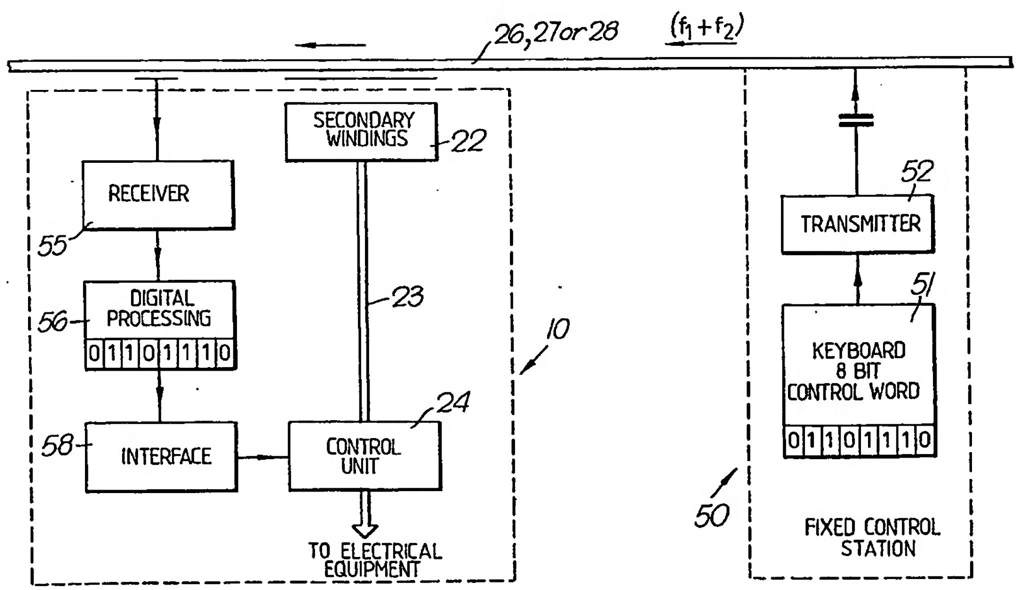
(71) Applicants
United Kingdom Atomic Energy Authority, (Great Britain), 11 Charles II Street, London SW1Y 4QP.
(72) Inventors
Richard John Aspley,
Dennis Peter David Brown.
(74) Agents
United Kingdom Atomic Energy Authority, (J.E. Alderman), Patents Branch, 11 Charles II Street, London SW1Y 4QP.

(54) A communications system

(57) A communications system for a device 10 incorporates a conductor 26 extending along a locus near to the device 10, and a transmitter 52 arranged to transmit signals through the conductor 26. The system also includes a receiver 55 at the device 10, arranged to detect the signals by capacitive means. The signals consist of two or more frequencies which are converted to corresponding voltage levels at the receiver 55. The device 10 may be a carriage driven alongside the conductor 26 by a motor receiving drive current from the conductor by inductive coupling.

Fig.3.



The drawings originally filed were informal and the print here reproduced is taken from a later filed formal copy.
The date of filing shown above is that provisionally accorded to the application in accordance with the provisions of Section 15(4) of the Patents Act 1977 and is subject to ratification or amendment at a later stage of the application proceedings.

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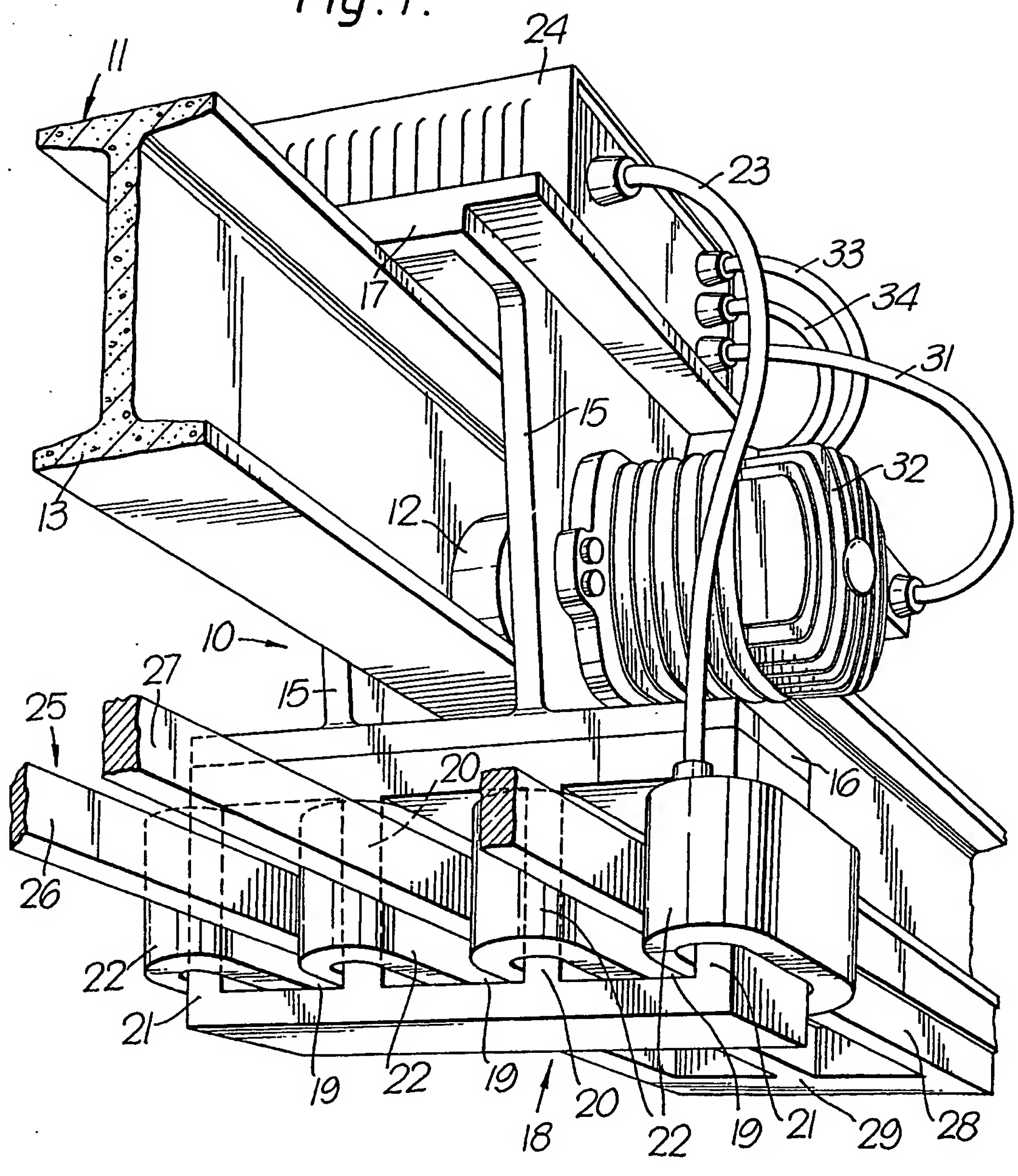
Fig. 1.



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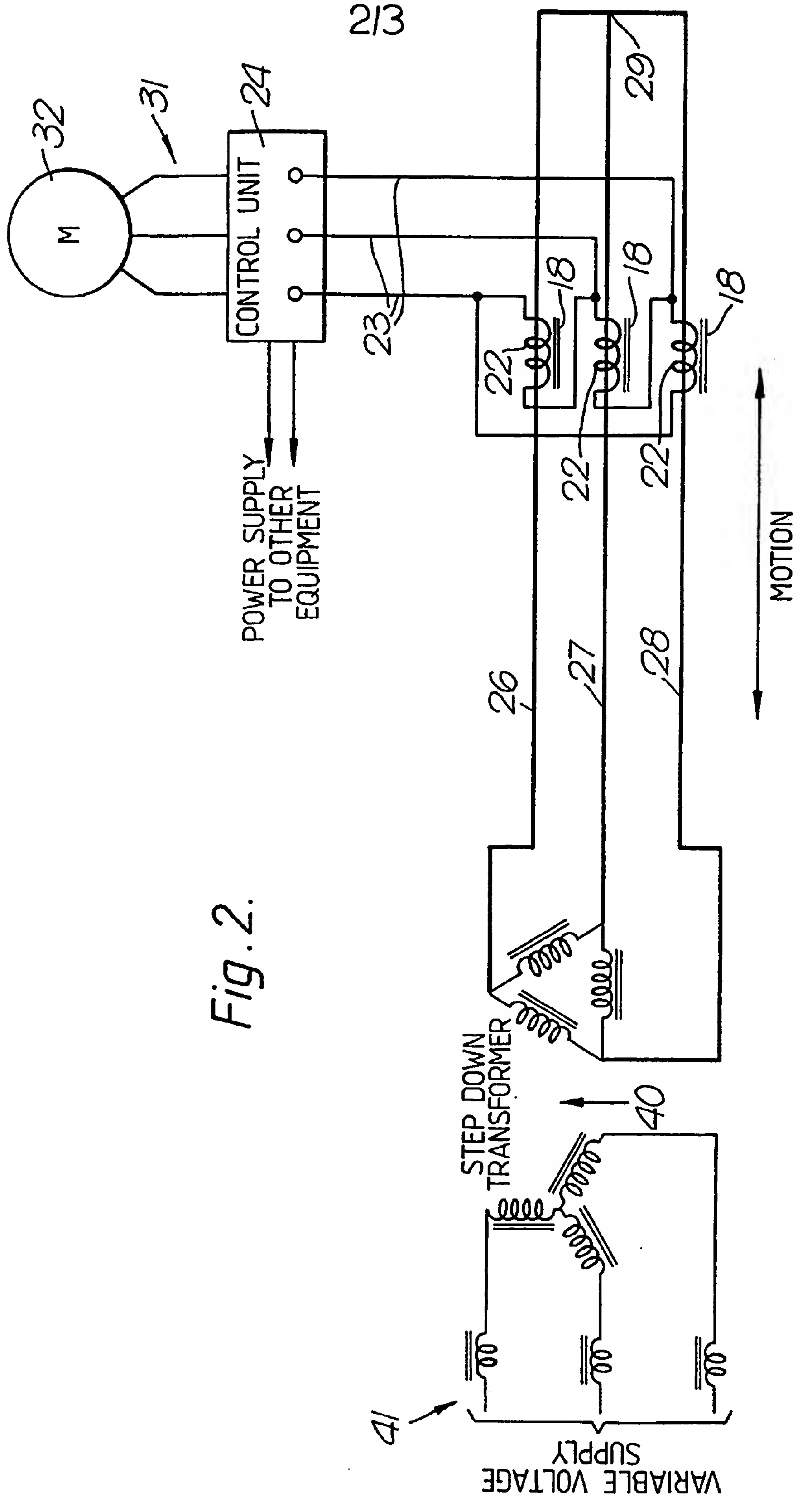
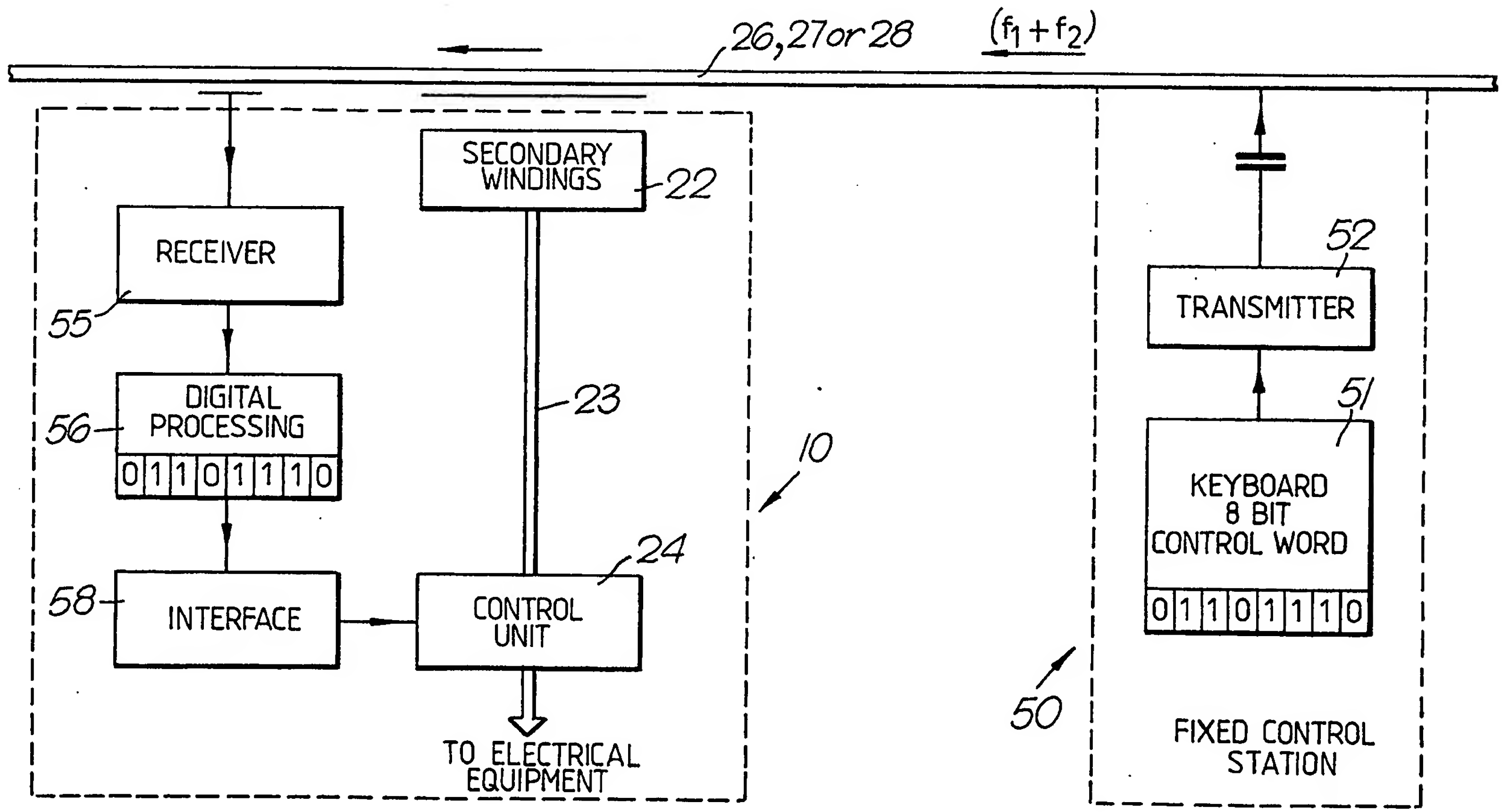


Fig. 2.

Fig.3.



26,27or 28
(f_1+f_2)
SECONDARY WINDINGS
22
RECEIVER
55
DIGITAL PROCESSING
0 1 1 0 1 1 1 0
56
23
10
24
58
INTERFACE
CONTROL UNIT
TO ELECTRICAL EQUIPMENT
52
TRANSMITTER
51
KEYBOARD 8 BIT CONTROL WORD
0 1 1 0 1 1 1 0
50
FIXED CONTROL STATION

SPECIFICATION

A communications system

The invention relates to a communication system, and in one aspect according to the invention in a communication system comprising a transmitter, a conductor through which signals from the transmitter are arranged to be transmitted, and a receiver for said signals, the receiver is arranged to detect the signals in the conductor by capacitive means.

In another aspect, the invention provides a method of communicating with a device, the method comprising transmitting signals through a conductor adjacent to the device, and receiving the signals at the device by capacitive means.

The device may be movable in a controlled manner along a locus, and the conductor may extend substantially parallel to said locus and might also transmit electric power for the device.

Preferably, the transmitter comprises capacitive means, and desirably is arranged to transmit the signals in the form of two signal frequencies to represent a digital word. The receiver may be arranged to convert the signal frequencies to voltage levels, and an output from the receiver may be processed to provide a control word related to said output for an interface means.

The invention will now be further described by way of example only and with reference to the accompanying drawings, in which:-

Figure 1 shows a perspective view of a mobile carriage powered by an induction electric coupling;

Figure 2 shows a circuit schematic diagram of the inductive electric coupling of Figure 1, and

Figure 3 shows a communications link system for controlling the mobile carriage of Figure 1.

Referring now to Figure 1, a mobile carriage 10 is shown about an I-section beam 11, and is supported on the beam 11 by two pairs of metal wheels 12 in tandem (only one wheel 12 is shown), a pair of the wheels 12 being at each side of the beam 11 and arranged to run on a lower flange 13 of the beam 11. The carriage 10 has a vertical tie portion 15 at each side of the beam 11 to which the wheels 12 are rotatably located, the tie portions 15 being joined at the lower ends thereof to a cross-piece 16 and depend at the upper ends thereof from a platform 17. The cross-piece 16 supports a magnetizable iron core 18 of rectilinear shape and has three windows 19 defined by two inner vertical members 20 and two outer vertical members 21 of the core 18.

Three secondary windings 22 each comprising a plurality of continuous cable turns (not shown), are disposed around the magnetizable iron core 18, and are each connected by a lead 23 (only one is shown) to a control unit 24. Two such windings 22 comprise the turns around the two inner vertical members 20 respectively, and the turns around the outer members 21, joined in series, form the third winding 22.

A three phase primary winding 25 in the form of three copper or aluminium bus-bars 26, 27 and 28 respectively in parallel relationship are joined in a star-connection 29 at one end and extend through respective windows 19 in the core 18. A lead 31 from the control unit 24 is connected to a three phase electric motor 32 which is connected by a gear drive (not shown) to one pair of the wheels 12 so as to drive the carriage 10 along the beam 11 when the electric motor 32 is energised, the other pair of wheels 12 being free-running. Supply leads 33, 34 from the control unit 24 may be connected to other electrically powered equipment, for example an electric hoist (not shown) and/or a master slave manipulator (not shown).

Referring now to Figure 2, the bus-bars 26, 27, 28 are shown connected to a step-down three phase transformer 40 which is energised from a three phase variable voltage supply 41.

In operation, when a three phase alternating electric current is supplied to the step-down tranformer 40, and thus to the bus-bars 26, 27, 28, an alternating magnetic flux is set up in the core 18 which induces an electric current in the secondary windings 22. The secondary windings 22 supply an induced three phase current via the control unit 24 to the electric motor 32 which drives the gear train and thus the respective pair of wheels 12 to drive the carriage 10 along the beam 11 as shown by the arrows.

In order to control the control unit 24, and thus individual equipments to which it is connected, a capacitive pick-up communications link may be used as shown in Figure 3 to which reference is made. In Figure 3 a fixed control station 50 is arranged to transmit a digital control word serially through one of the bus-bars 26, 27, 28, using frequency shift keying techniques in which a digital '1' is represented by one frequency (f1) and a digital '0' by another frequency (f2), (f1) and (f2) being in the region of 1 MHz. The fixed control station 50 comprises a key board 8 bit control word 51 connected to a capacitive transmitter 52. At the carriage 10, the control words transmitted by the bus-bars 26, 27 or 28, are detected by a capacitive receiver 55 to convert the frequency signals (f1), (f2) to voltage levels representing 1's and 0's which are passed to a digital processing unit 56 to produce the complete control word. The control word is passed to an interface ciruit 58 connected to the control unit 24 and thus controls the application of the electric power induced in the secondary windings 22.

Of the 8 bit control word, two bits are used for error detection, and the data flows from the fixed control station 50 to the carriage 10, although if desired a two-way data system could be used and the word length extended.

The communications link described in relation to Figure 3 "fails safe" in that all applications of electric power controlled by the control unit 24 are terminated in the event of:-

(a) the output of the receiver 55 being low or,

(b) the digital word being corrupted or,

(c) drift occurring in the frequencies transmitted.

It will be understood that the bus-bars 26, 27, 28 may be straight or of alternativa shape, for example of arcuate shape for applications in which the cariage 10 is required to follow an arcuate path, and need not be coplanar.

CLAIMS

1. A communication system comprising a transmitter, a conductor through which signals from the transmitter are arranged to be transmitted, and a receiver for said signals, wherein the receiver is arranged to detect the signals in the conductor by capacitive means.

2. A system as claimed in Claim 1, wherein the transmitter comprises capacitive means.

3. A system as claimed in Claim 1 or Claim 2, wherein the receiver is located at a device to be controlled by the system, and the device is movable in a controlled manner along a locus.

4. A system as claimed in Claim 3, wherein the conductor extends substantially parallel to said locus.

5. A system as claimed in Claim 3 or Claim 4, wherein the conductor is also arranged to transmit electric power for the device.

6. A system as claimed in any one of the preceding Claims, wherein the transmitter is arranged to transmit the signals in the form of two signal frequencies to represent a digital control word.

7. A system as claimed in Claim 6, wherein the signal frequencies are in the region of 1 MHz.

8. A system as claimed in Claim 6 or Claim 7, wherein the receiver is arranged to convert the signal frequencies to voltage levels.

9. A system as claimed in any one of the preceding Claims, including processing means for processing an output from the receiver and for providing a control word related to said output for an interface means.

10. A method of communicating with a device, the method comprising transmitting signals through a conductor adjacent to the device, and receiving the signals at the device by capacitive means.

11. A method as claimed in Claim 10, wherein the signals comprise two signal frequencies transmitted serially through the conductor so as to represent a digital control word.

12. A method as claimed in Claim 11, wherein the signal frequencies are in the region of 1 MHz.

13. A method as claimed in Claim 11 or Claim 12, including converting the received signal to voltage levels representing the signal frequencies.

14. A method as claimed in Claim 13, including processing the voltage levels to provide a control word for an interface means.

15. A method as claimed in any one of Claims 10 to 14, wherein the device is movable in a controlled manner along a locus.

16. A communication system substantially as hereinbefore described with reference to Figure 3 of the accompanying drawings.

17. A method of communicating with a device, substantially as hereinbefore described with reference to Figure 3 of the accompanying drawings.

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